LANDS AND FORESTS
TECHNICAL NOTE

SMALL GAME SURVEY 1988

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Since 1967 we have used the Small Game Survey to collect small game harvest data from Nova Scotia licensed hunters. We do this by mailing questionnaires to a stratified random sample of hunters who purchased a small game license. (No license is required to hunt snowshoe hare.)

Until 1988, the survey had involved one questionnaire for game taken until December 15 and, to accommodate the later waterfowl season, another for game taken from December 16 until January 15. In 1988, we decided to ask only for upland game harvested to December 15, as the waterfowl section of the survey is now done by the Canadian Wildlife Service.

METHOD

On December 19, 1988 we mailed 3,000 questionnaires (see Appendix 1 for sample form) to resident small game licensees. The number of questionnaires per county was stratified on the basis of proportional license sales from the previous year.

RESULTS

A total of 26,062 residents purchased small game licenses in 1988. In addition 10,148 senior citizens obtained complimentary licenses, for a total of 36,210 potential hunters. The usable responses from the survey were 1,480 or 49.3 per cent. A total of 23.9 per cent reported hunting in more than one county.

The percentage of hunters who reported hunting for each species is as follows:

Waterfowl	28.6%
Ruffed grouse	64.3%
Ring-necked pheasant	18.9%
Snowshoe hare	52.0%
No hunting	14.6%

The percentage of hunters who reported hunting for a combination of species is listed below:

No hunting	14.6%
Waterfowl only	6.3%
Grouse only	17.2%
Pheasant only	1.3%
Hare only	6.4%
Hare and grouse	21.2%
Hare and pheasant	2.3%
Hare and waterfowl	3.9%
Grouse & pheasant	3.4%
Grouse & waterfowl	3.1%
Pheasant & waterfowl	0.4%
Hare, grouse, pheasant	5.1%
Hare, waterfowl, pheasant	0.6%
Grouse, waterfowl, pheasant	1.8%
Hare, grouse, waterfowl	8.4%
All four species	4.1%

The calculated kills for all hunters for each county are shown in Table 1.

For each county, 95 per cent confidence interval (95% C.I.) for each species tends to be greater than ±40 per cent, although they are somewhat better for counties with the larger samples. For each of the three regions and province-wide, 95% C.I.'s are as follows::

	Grouse	Hare	Pheasant
Province	± 8.9%	±15.1%	±23.4%
Cape Breton Island	±15.0%	±46.7%	N/A
Eastern	±14.2%	±23.2%	±47.6%
Western	±17.3%	±22.5%	±28.8%

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Calculated kills for all three game species over the last seven years are presented in Tables 2, 3 and 4. Comparing this year and last year's kill figures, we found that the only significant difference at the 95 per cent confidence level for all species at the provincial or regional level was an increase in the grouse harvest on Cape Breton Island.

We measured hunter success by the average kill per hunter for "potential hunters" in each county. A potential hunter was one who reported harvesting any upland game in a county or who was a resident of that county but didn't report harvesting any game. The results for the last three years are shown in Tables 5, 6 and 7.

This data indicates 1988 hunter success rate for ruffed grouse increased significantly in the Eastern region as well as Cape Breton Island.

The Western region showed a slight but insignificant decrease, and there was considerable variability at the county level. For the entire province there was a significant increase.

For 1988, data from the Western and Cape Breton regions showed little change in snowshoe hare harvest from the previous year, but the Eastern region harvest figures were significantly higher. The combined results from Cape Breton and Richmond counties showed a significant increase, while the combined results from Inverness and Victoria counties showed a significant decrease.

The results for ring-necked pheasants suggest a slight increase in the 1988 population in the Western region.

DISCUSSION

The current Upland Game Survey appears sensitive to changes at the regional level but is often unable to statistically identify annual differences at the county level. This can be an important consideration, as evidenced by snowshoe hare harvest data from Cape Breton Island. In order to get more statistically reliable information at the county level we need to increase the sample size. This will be done by converting to the report card system attached to the small game license in 1989.

As a measure of population trends within an area, kill per hunter is considered to be better than the calculated kill because it is less affected by the number of hunters moving to an area. Future surveys will rely on kill per hunter as an index of population abundance and will use calculated kill to put the magnitude of the kill in perspective.

NOTE: Because of apparent misreporting, especially in the Cape Breton region, exercise caution in interpreting some pheasant data. We believe species misidentification is the cause.

Table 1. *Calculated kill for upland game harvested before December 16 in the 1988/89 season.*

County	Hare	Grouse	Pheasant
Annapolis	4,037	2,520	1,028
Digby	6,459	3,230	1,370
Kings	6,948	4,624	4,086
Lunenburg	5,260	3,792	294
Queens	3,450	4,551	196
Shelburne	6,606	2,544	24
Yarmouth	10,104	1,541	489
Western	**42,864**	**22,802**	**7,487**
Antigonish	6,068	3,156	0
Colchester	5,138	6,117	465
Cumberland	25,004	7,389	294
Guysborough	11,328	2,153	24
Halifax	13,432	5,285	1,370
Hants	10,471	6,239	1,272
Pictou	7,389	8,221	196
Eastern	**78,830**	**38,560**	**3,621**
Cape Breton	8,563	7,633	465
Inverness	6,019	8,857	98
Richmond	10,251	4,795	0
Victoria	2,496	3,963	49
Cape Breton Island	**27,329**	**25,248**	**612**
Province	**149,023**	**86,610**	**11,720**

Table 2. *Calculated kill of snowshoe hare harvested before December 16, 1982-1989.*

County	82/83	83/84	84/85	85/86	86/87	87/88	88/89
Annapolis	7,700	9,217	10,865	9,148	9,383	2,389	4,037
Digby	14,169	13,448	10,631	11,788	20,821	14,722	6,459
Kings	11,110	11,874	7,488	5,511	3,334	5,049	6,948
Lunenburg	11,005	7,774	8,458	7,005	8,297	5,704	5,260
Queens	3,762	6,888	3,919	6,354	3,684	1,503	3,450
Shelburne	4,150	3,772	9,002	12,706	9,771	4,471	6,606
Yarmouth	15,295	6,396	10,476	7,922	6,824	15,416	10,104
Western	**67,191**	**59,369**	**60,839**	**60,434**	**62,114**	**49,254**	**42,864**
Antigonish	9,950	11,381	8,148	11,482	5,506	8,671	6,068
Colchester	17,580	9,119	12,377	21,624	5,816	3,661	5,138
Cumberland	32,805	23,517	15,986	22,083	13,183	10,753	25,004
Guysborough	17,545	16,564	14,201	12,438	5,467	7,554	11,328
Halifax	35,371	18,007	37,830	16,266	6,785	12,834	13,432
Hants	15,259	11,972	12,920	6,736	8,724	5,588	10,471
Pictou	13,220	12,825	11,368	7,923	5,118	3,545	7,389
Eastern	**141,730**	**103,385**	**112,830**	**98,552**	**50,599**	**52,606**	**78,830**
Cape Breton	14,064	34,801	12,338	11,788	17,331	7,631	8,563
Inverness	8,017	13,382	13,386	19,059	27,490	17,034	6,019
Richmond	13,678	9,380	12,144	8,880	5,854	2,737	10,251
Victoria	5,590	8,889	9,002	7,923	10,469	4,780	2,496
Cape Breton Island	**41,349**	**66,452**	**46,870**	**47,650**	**61,144**	**32,182**	**27,329**
Total	**250,270**	**229,206**	**220,539**	**206,636**	**173,857**	**134,042**	**149,023**

Table 3. *Calculated kill of ruffed grouse, 1982-1989.*

County	82/83	83/84	84/85	85/86	86/87	87/88	88/89
Annapolis	5,204	3,870	5,898	6,009	5,622	6,089	2,520
Digby	2,356	1,935	2,910	3,521	4,187	1,850	3,230
Kings	4,430	3,805	4,462	2,526	4,808	4,201	4,624
Lunenburg	6,575	5,871	2,998	4,440	5,389	5,049	3,792
Queens	2,391	2,460	1,474	5,511	5,002	5,473	4,551
Shelburne	844	689	3,492	2,182	3,838	2,312	2,544
Yarmouth	3,305	2,329	2,794	4,019	3,412	2,428	1,541
Western	**25,105**	**20,959**	**24,028**	**28,208**	**32,258**	**27,402**	**22,802**
Antigonish	3,797	2,722	2,677	4,210	3,683	4,355	3,156
Colchester	6,540	4,887	6,092	12,668	7,948	6,012	6,117
Cumberland	6,997	6,232	6,208	13,663	6,475	6,359	7,389
Guysborough	4,149	2,329	3,414	5,856	2,637	2,312	2,153
Halifax	8,474	3,378	8,226	4,937	4,187	4,394	5,285
Hants	3,868	4,002	5,238	5,396	4,420	4,972	6,239
Pictou	8,474	7,839	7,838	11,673	6,475	6,166	8,221
Eastern	**42,299**	**31,389**	**39,693**	**58,403**	**35,825**	**34,570**	**38,560**
Cape Breton	6,575	12,726	5,432	12,974	4,808	3,738	7,633
Inverness	5,274	8,922	10,903	16,266	8,103	7,361	8,857
Richmond	1,055	2,165	2,871	5,358	2,637	1,927	4,795
Victoria	3,024	9,774	14,511	11,214	7,134	3,738	3,963
Cape Breton Island	**15,928**	**33,587**	**33,717**	**45,812**	**22,682**	**16,764**	**25,248**
Total	**83,332**	**85,935**	**97,438**	**132,423**	**90,765**	**78,736**	**86,610**

Table 4. *Calculated kill of ring-necked pheasant, 1982-1989.*

County	82/83	83/84	84/85	85/86	86/87	87/88	88/89
Annapolis	1,371	1,542	1,397	1,914	1,163	925	1,028
Digby	1,653	2,165	815	1,837	4,304	1,195	1,370
Kings	3,692	5,117	5,975	4,401	5,079	2,698	4,086
Lunenburg	106	361	1,086	191	465	154	294
Queens	0	66	39	268	233	0	196
Shelburne	70	0	39	38	0	0	24
Yarmouth	985	328	892	383	659	886	489
Western	**7,877**	**9,579**	**10,243**	**9,032**	**11,903**	**5,858**	**7,487**
Antigonish	0	0	78	230	0	0	0
Colchester	598	886	1,242	344	1,086	462	465
Cumberland	352	1,181	1,164	919	465	540	294
Guysborough	0	98	194	0	0	0	24
Halifax	633	426	1,280	191	582	308	1,370
Hants	316	1,738	1,785	1,493	1,590	1,966	1,272
Pictou	106	0	116	153	271	193	196
Eastern	**2,005**	**4,329**	**5,859**	**3,330**	**3,994**	**3,469**	**3,621**
Cape Breton	0	66	116	0	0	77	465
Inverness	70	131	39	230	39	308	98
Richmond	0	33	39	0	0	0	0
Victoria	176	33	39	77	382	0	49
Cape BretonIsland	**246**	**263**	**233**	**307**	**427**	**385**	**612**
Total	**10,128**	**14,171**	**16,335**	**12,669**	**16,324**	**9,712**	**11,720**

Table 5. *Snowshoe hare kill per hunter before December 16.*

County	1986	1987	1988
Annapolis	3.46	0.98 —	2.09 ++
Digby	9.10	6.37 **	3.77 **
Kings	0.91	1.62 +	2.43 +
Lunenburg	2.14	1.80 **	1.64 **
Queens	1.42	0.83 **	1.75 +
Shelburne	4.58	2.58 **	4.74 **
Yarmouth	3.14	7.27 +	4.75 **
Western	**3.20**	**2.95 ** **	**2.81 ** **
Antigonish	3.64	6.08 +	6.05 **
Colchester	1.33	0.98 **	1.62 +
Cumberland	3.82	3.32 **	8.31 ++
Guysborough	2.88	3.44 **	6.91 +
Halifax	1.09	2.18 +	2.10 **
Hants	2.62	1.42 **	3.29 ++
Pictou	2.03	1.33 **	2.70 ++
Eastern	**2.17**	**2.28 ** **	**3.73 +++**
Cape Breton	5.14	2.44 —	3.02 **
Inverness	8.75	5.82 **	2.41 —
Richmond	4.58	1.52 —	7.42 +
Victoria	4.35	2.76 **	1.50 **
Cape Breton Island	**6.00**	**3.38 —**	**3.27 ** **
Province	**3.28**	**2.72 -**	**3.33 ++**

Change from previous year:
** no significant difference
+ significant increase at P<.10
++ significant increase at P<.05
+++ significant increase at P<.01
- significant decrease at P<.10
— significant decrease at P<.05
— significant decrease at P<.01

Table 6. *Ruffed grouse kill per hunter.*

County	1986	1987	1988
Annapolis	2.07	2.51 **	1.30 —
Digby	1.83	0.80 —	1.89 +++
Kings	1.32	1.35 **	1.62 **
Lunenburg	1.39	1.60 **	1.18 **
Queens	1.93	3.02 +	2.19 **
Shelburne	1.80	1.33 -	1.82 **
Yarmouth	1.57	1.55 **	0.82 —
Western	**1.66**	**1.64 ** **	**1.49 ** **
Antigonish	2.44	3.05 **	3.15 **
Colchester	1.81	1.61 **	1.92 **
Cumberland	1.88	1.96 **	2.46 **
Guysborough	1.39	1.05 -	1.31 **
Halifax	0.68	0.75 **	0.83 **
Hants	1.33	1.26 **	1.96 +
Pictou	2.57	2.32 **	3.00 **
Eastern	**1.54**	**1.50 ** **	**1.82 ++**
Cape Breton	1.43	1.20 **	2.67 +++
Inverness	2.58	2.51 **	3.55 ++
Richmond	2.06	1.14 —	3.44 +++
Victoria	2.97	2.16 -	2.38 **
Cape Breton Island	**2.22**	**1.77 —**	**3.00 +++**
Province	**1.72**	**1.60 -**	**1.93 +++**

Change from previous year:
** no significant difference
\+ significant increase at P<.10
++ significant increase at P<.05
+++ significant increase at P<.01
\- significant decrease at P<.10
— significant decrease at P<.05
— significant decrease at P<.01

Table 7. *Ring-necked pheasant kill per hunter.*

County	1986	1987	1988
Annapolis	0.43	0.38 **	0.53 **
Digby	1.88	0.52 —	0.80 **
Kings	1.39	0.86 -	1.43 +
Lunenburg	0.12	0.05 **	0.09 **
Queens	0.09	0.00 —	0.09 ++
Shelburne	0.00	0.00 **	0.02 **
Yarmouth	0.30	0.42 **	0.23 **
Western	**0.61**	**0.35 —**	**0.49 +**
Antigonish	0.00	0.00 **	0.00 **
Colchester	0.25	0.12 -	0.15 **
Cumberland	0.13	0.17 **	0.10 **
Guysborough	0.00	0.00 **	0.01 **
Halifax	0.09	0.05 **	0.21 **
Hants	0.48	0.50 **	0.40 **
Pictou	0.11	0.07 **	0.07 **
Eastern	**0.17**	**0.15 ****	**0.17 ****
Cape Breton Island	0.00	0.02 **	0.16 +
Inverness	0.01	0.11 **	0.04 **
Richmond	0.00	0.00 **	0.00 **
Victoria	0.16	0.00 **	0.03 **
Cape Breton Island	**0.04**	**0.04 ****	**0.07 ****
Province	**0.31**	**0.20 —**	**0.26 +**

Change from previous year:

**	no significant difference
+	significant increase at P<.10
++	significant increase at P<.05
+++	significant increase at P<.01
-	significant decrease at P<.10
—	significant decrease at P<.05
—	significant decrease at P<.01

Appendix 1.

No. 0345 **Nova Scotia Small Game Survey** **Oct. 1, 1988 to Dec. 15, 1988**

(Do not include any game shot, or game hunted after Dec. 15, 1988)

PLEASE COMPLETE THIS CARD AND MAIL TODAY

Please read instructions carefully. Fill in the appropriate spaces, even though you may not have hunted or killed anything. Please mail completed card today.

THANK YOU
Merrill Prime
Director of Wildlife

(1) COUNTY HUNTED Please list below the names of all Counties in which you hunted Upland Game this fall.

(2) Did you hunt this bird (or animal)? Please check "yes" or "no" under EACH kind of game.

(3) Indicate below the number and kind of game you killed in each County hunted.

(1) COUNTY HUNTED	(2)	RABBIT				
		With Dog	Without Dog	Snared	Ruffed Grouse	PHEASANTS
	YES					
	NO					
☛	Number Killed ☛					
☛	Number Killed ☛					
☛	Number Killed ☛					
☛	Number Killed ☛					

Did you hunt waterfowl this season? ☐ YES ☐ NO

Results of this survey will be reported in "Nova Scotia Conservation", available free by writing the Department of Lands & Forests, PO Box 68, Truro, Nova Scotia, B2N 5B8